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Is Discretionary Fiscal Policy Effective? The Caribbean Experience

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Abstract

Governments' recourse to fiscal policy to mitigate the effects of the recent global economic crisis has renewed interest on the role of fiscal policy on influencing economic activity. Understanding the effectiveness of fiscal policy to economic activity aids policymakers spending decisions. Accordingly, this paper analyzes the economic effects of discretionary fiscal policy (i.e. increases in government expenditures and tax cuts) in the Caribbean – Barbados, Jamaica and Trinidad and Tobago. Using structural vector autoregressive and structural vector error correction models, the estimates show that government spending policies can stimulate the economy of Jamaica and Trinidad and Tobago but not of Barbados. Discretionary tax policies are found desirable in consolidating fiscal balances.

Keywords: fiscal shocks, Caribbean, structural vector autoregressive models; structural vector error correction models

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1. Introduction

The 2008-2009 global economic crisis wrecked havoc across the world including the Caribbean. The IMF (2010) reported that real output in the Caribbean contracted by 2.8 percent compared to 0.6 percent, the global average in 2009. Across the region, however, there were diverse effects on output. Barbados' output fell by 0.2% in 2008 and slumped by a further 4.4% in 2009. Jamaica recorded economic downturns of 0.9% and 2.7% in 2008 and 2009 respectively. Trinidad and Tobago's economic growth decelerated in 2008 and declined by 3.2% in 2009. Similar to OECD countries, the Caribbean economies responded by injecting large discretionary fiscal stimulus packages in 2009 to dampen recessionary pressures and stimulate their economies. While Jamaica's fiscal expansion focused on both expanding government spending and tax cuts, Barbados and Trinidad and Tobago responded through increasing government expenditure.

Such recourse of governments to fiscal policy to mitigate the effects of the global economic crisis renewed interest on the role of fiscal policy on influencing economic activity. Economic theory, however, is not conclusive on whether discretionary fiscal policy is effective. The classical models believe that the market system automatically adjusts to booms and busts. Therefore, they presume no role for fiscal policy indicating its ineffectiveness. However, both neoclassical and neo-Keynesian models imply a positive effect of government spending on output; albeit different dynamics. The neoclassical models typically predict a negative effect on private consumption (see, e.g., Baxter and King (1993)), while neo-Keynesian models predict the opposite sign.

Akin to theory, the empirical literature offers no consensus on the size or even the sign of the effects of fiscal shocks on output. The evidence is largely based on two approaches: the "dummy variable" approach and the "structural vector autoregressive" (SVAR) models. Studies on the dummy variable approach typically report negative private consumption and positive output response to government spending; see for example Ramey and Shapiro (1998). The approach relies on the narrative record and news about fiscal build-ups to identify shocks to government spending. Although the approach identifies shocks postulated as truly exogenous to the system, it is subject to the researcher's ability to accurately identify the date such exogenous shocks occurred. Thus, several studies use the SVAR approach pioneered

by Blanchard and Perotti (2002). It involves identifying fiscal policy "shocks" using SVARs and simulating the dynamic impact of these shocks on GDP and other variables of interest. The SVAR studies typically find a larger effect of government spending on GDP and in some cases crowding-in of consumption (e.g. Blanchard and Perotti, 2002, and Gali et al., 2007). Other SVAR studies find crowding-out of consumption and a smaller but positive effect on GDP (see Perotti, 2009). Mountford and Uhlig (2009) use less restrictive sign-restrictions to identify fiscal shocks and find much smaller deficit-spending multipliers.

Ilzetzki et al. (2010) examine fiscal multipliers for 45 countries contrasting advanced and developing countries using the structural VAR approach. They find that output effect of an increase in government consumption tend to be larger in industrial countries, in economies with predetermined exchange rates (but zero in flexible exchange rate economies), in more closed economies, and in economies with lower debt levels. This paper complements this study (and other fiscal policy effect studies) by investigating the output effects of discretionary fiscal shocks – changes in government spending and taxes – in the Caribbean to offer evidence of alternative economic environments. The three largest Anglo-Caribbean countries by GDP size are considered – Barbados, Jamaica and Trinidad and Tobago. Barbados and Trinidad and Tobago are high income countries, while Jamaica is an upper middle income country (World Bank, 2009). More so, Barbados operates a fixed exchange rate system for over 30 years. Trinidad and Tobago has a crawling peg (quasi-fixed exchange regime) while Jamaica operates a flexible exchange rate since 1991. All three countries are open economies, though Jamaica and Barbados are more indebted than Trinidad and Tobago.

Few studies have been done in the Caribbean. Guy and Maynard (2009) and Bynoe and Maynard (2008) employ SVAR to address the effectiveness of fiscal policy in Barbados. These studies, however, consider only one country which does not necessarily provide guidance for analyzing the impact of fiscal shocks in the Caribbean as a whole. Using the widely adopted SVAR approach over the period 1980-2009, our paper finds that expansionary government spending has a transitory positive impact on GDP in Jamaica and Trinidad and Tobago. In the case of Barbados and in contrast to Bynoe and Maynard (2008), government spending is not effective in jump-starting the economy. Interestingly, in all countries we find taxes to be effective on fiscal consolidation but not stimulating the economy.

The next section proceeds to relate important features of fiscal policy in each country. Section 3 discusses the econometric approach while section 4 presents the data and the estimation results. Finally, section five concludes.

2. Background country experiences: contractions and fiscal policy

According to World Bank (2009), Barbados and Trinidad and Tobago are high income nations with PPP real GDP per capita of US$21,600 and US$21,300 respectively while Jamaica is an upper-middle income country recording US$8,400 real GDP per capita in 2009. Each country, however, has had several periods of growth and contractions since 1960. Barbados experienced 6 phases of output contractions, Trinidad and Tobago had 3 phases and Jamaica underwent 4 periods of contractions. Table 1 shows the specific years of economic downturns for each country.

Table 1: Economic contractions since 1960

Barbados	*Trinidad & Tobago*	*Jamaica*
1963		
1974		1973-1980
1981-1982	1983-1989	1984-1985
1990-1992	1992-1993	
		1996-1998
2001-2002		
2008-2009	2009	2008-2009

Source : World Bank -World Development Indicators (2009)

The subsequent sub-sections discuss the economic developments of each country with particular focus on contractions and associated fiscal policies. All three countries moved away from relying on agriculture to a strong tourism base. In addition, Barbados has a vibrant offshore financial services sector, Trinidad has strong manufacturing sector and oil and gas production sectors and Jamaica has a large mining sector led by bauxite and alumina.

2.1. Barbados

In 1963, three years before independence, Barbados experienced an economic decline, which was engendered by the 1960-1961economic recession in the United

States. During that time the country was a low-income economy that was highly dependent on agriculture, mainly sugar production. In 1974 another economic contraction occurred due to the global oil crisis induced recession which heavily impinged the tourism sector. The government responded in 1975 by increasing both current and capital spending by 10 percent and 28 percent respectively.

The following 6 years averaged real GDP growth of 0.6%. In 1981 and 1982 real GDP fell due to recessionary conditions in the US and Europe which led to a sharp decline in tourist arrivals and weaker demand for domestic exports. Large government outlays in 1981 were reflected in higher wages and in the expansions of government's extensive capital works programme, but slower revenue growth resulted in a significant build-up of the fiscal deficit (Maynard, 2009). To boost the ailing economy, the government obtained a Eurodollar loan while the central bank relied on international credit lines mainly the IMF. The resultant reduced economic activity in 1981, lowered government revenue. Hence, government controlled current expenditures in 1982 which halved budget deficit. However, difficulties in financing the deficit still persisted.

The international economic conditions improved and so did the tourism sector. Thus, economic growth expanded for almost a decade. In 1991 and 1992 Barbados experienced a deep recession. The recession was largely attributable to a fall in sugar exports and the Gulf war which adversely affected the tourism sector. In order to restore the economy, the government borrowed funds from the IMF which also paved way for the adoption of IMF structural adjustment beginning in 1993. The adjustment program included restrictions on fiscal spending such that by the end on 1993 fiscal deficit decreased to 0.5% due to stronger revenue growth. Consequently, growth rates have averaged between 3%-5% from 1993-2000.

A combination of economic liberalization (through deregulation of the banking sector), negative spillover effects of a depressed world economy and the September 11, 2001 terrorism attacks in U.S, caused a domestic banking liquidity crisis; which resulted in economic contractions in 2001 and 2002. To help better manage the challenges posed by this deteriorating economic climate, government issued a US$ 150 million international bond in the last quarter of 2001. In order to stimulate economic activity, the government adopted expansionary policies by increasing both current and capital outlays, which resulted in an increase in the fiscal deficit.

As the recent global recession hit, Barbados suffered negative growth in both 2008 and 2009. In response the government injected a fiscal stimulus package in 2009.

2.2. Jamaica

Jamaica experienced a deep economic recession from 1973-1980. The recession was largely due to the international oil shocks of 1973-74 and 1979-80; which resulted in declines in the sale of bauxite and alumina products due to increase costs of processing transport.

After a period of steady growth from 1986 to 1995, real GDP decline by 0.1%, 1.1% and 2.3% in 1996, 1997 and 1998 respectively. The decline in GDP in 1996 and 1997 was largely due to a banking crisis triggered by the financial liberalization initiated since 1991 (Kirkpatrick, 2002). In 1997, a severe island-wide drought (the worst in 70 years) that drastically reduced agricultural production was primarily responsible for dwindling output the following year. At first, government provided liquidity support through the central bank. That is, government intervened in the distressed institutions mostly through capital injections, in exchange for equity, board seats and assets. Nonetheless, in some instances other institutions were closed exacerbating the economic decline.

The global economic crisis also hit Jamaica in 2008-2009. In 2009, Jamaica implemented a stimulus package which included tax cuts, duty exemptions and loans to help the economy's most vulnerable sectors.

2.3. Trinidad and Tobago

For a while Trinidad and Tobago – a petroleum based economy – was sparred from the upsurge of oil crisis in 1970s and 1980s which caused significant strain in Barbados, Jamaica and Guyana. With the drastic reduction in oil prices in the mid and later half of 1980s fortunes were reversed. The country underwent a prolonged period of economic decline from 1983 to 1989. Real GDP slumped each year recording an average contraction of 9% per year. Consequently, the fiscal position deteriorated.

The economy recovered in 1990 and 1991. However, the economic policy reforms enacted in 1991 aggravated by the global economic recession caused a contraction in output in 1992 and 1993 where GDP decline averaged 4.5%.

Over the next 15 years, the country boomed anchored by petroleum production. Nonetheless, the recent global turmoil dampened global demand in both energy and non-energy sectors. Consequently, in 2009 the government recorded its first deficits in seven years amounting to 5.3% of GDP from a surplus of 7.8% in 2008. At the end of March 2010, central government debt amounted to US$28,832.4 million, an increase of US$3,688.2 million above the end of 2009. Most of this increase was due to a private placement amounting to $3.1 billion which caused the central government domestic debt stock to rise to US$20,120.6 million in 2009.

3. Econometric Framework

This section discusses two econometric strategies used to estimate the effects of fiscal policy on economic activity in the Caribbean.

3.1 Structural vector autoregressive (SVAR)

First, we adopt structural VAR proposed by Blanchard and Perotti (2002) and Perotti (2004) to identifying fiscal shocks. These are identified through exploiting decision lags in policymaking as well as utilizing economic theory. The reduced form VAR is represented as follows:

$$X_t = A(L)X_{t-1} + U_t \tag{1}$$

where $X_t = (g_t, t_{t,} d_t, y_t)$ is the vector of endogenous variables containing government spending, tax revenue, debt to GDP ratio and real GDP respectively. $A(L)$ is an autoregressive lag polynomial. The vector $U_t = (u_t^g, u_t^t, u_t^d, u_t^y)$ contains the reduced-form residuals, which in general will present non-zero cross-correlations.

Identification strategy

The reduced-form residuals of g_t and t_t equations, u_t^g and u_t^t, can be thought of as linear combinations of three types of shocks: (a) the *automatic response* of spending and net taxes to GDP and debt innovations; (b) *systematic discretionary response* of fiscal policy to the macro variables in the system (for instance, reductions in tax rates that some countries could implement systematically in response to

recessions); and (c) *random discretionary fiscal policy* shocks, considered the truly uncorrelated structural fiscal policy shocks. Thus, the reduced-form residuals in the first two equations of (1) can be expressed as

$$u_t^g = \alpha_{g,y} u_t^y + \alpha_{g,d} u_t^d + \beta_{g,t} \varepsilon_t^t + \varepsilon_t^g \quad (2a)$$

$$u_t^t = \alpha_{t,y} u_t^y + \alpha_{t,d} u_t^d + \beta_{t,g} \varepsilon_t^g + \varepsilon_t^t \quad (2b)$$

where ε_t^g and ε_t^t are the 'structural' discretionary fiscal shocks. Given our interest is to analyse the effects of ε_t^g and ε_t^t on the rest of the variables, estimation of all $\alpha_{i,j}$ and $\beta_{i,j}$'s is required. Some restrictions on $\alpha_{i,j}$ are spelt out later which are necessary to identify the structural shocks and coefficients. Therefore, the reduced form innovations, U_t is a linear combination of the structural shocks, V_t; which can be written as:

$$U_t = \Gamma^{-1} B V_t, \text{ where } V_t = (\varepsilon_t^g, \varepsilon_t^d, \varepsilon_t^y, \varepsilon_t^t) \quad (3)$$

The structural shocks are assumed to be independently and identically distributed with covariance matrix equal to the identity. The SVAR can be obtained by substituting equation (3) into (1) and rearranging:

$$\Gamma X_t = \Gamma A(L) X_{t-1} + B V_t \quad (4)$$

3.2. Structural vector error correction (SVEC)

The second econometric procedure applied is a SVEC following Johansen and Juselius (1990), King et al. (1991), Jacobson et al. (1997), and Breitung et al. (2004). At first, tests for unit roots and cointegration *à la* Johansen are carried out. In the case where the data is nonstationary and cointegration exists, a SVEC procedure is used instead of the structural VAR. Cointegration relationship signals existence of a long-run stable relation among the variables in the system. In that case SVAR would not be the correct specification because an error correction term would be missing from the estimated reduced-form VAR. For that reason, the model should take into account that the variables are cointegrated and include the previous period deviation from

equilibrium, ΠX_{t-1}, in order to correctly identify the dynamics of the system after any shock.

The reduced-form of a first–order VEC can be written as: $\Delta X_t = \Pi X_{t-1} + A(L)\Delta X_{t-1} + \eta_t$ where the forecast errors are: $\eta_t = \Gamma^{-1} B V_t$. In this case, the SVEC would be: $\Gamma \Delta X_t = \Gamma \Pi X_{t-1} + \Gamma A(L)\Delta X_{t-1} + B V_t$. Similar to the structural VAR procedure, several restrictions should be imposed to the Γ matrix in order to identify the structural shocks and coefficients.

4. Empirical Analysis: Data, Results and Discussion

4.1 Data

Following Beetsma et al. (2008) and Bénétrix and Lane (2009, 2010), but in contrast to some related literature, we use annual data instead of quarterly data to study the impact of fiscal shocks on the real output of Barbados, Jamaica and Trinidad. Bénétrix and Lane (2009) show that the Perotti (2005) group of countries provide very similar results whether quarterly or annual data are employed. Hence, the choice of quarterly versus annual data makes little difference. The use of annual data also provides conceptual advantages over quarterly data. For instance, Beetsma et al. (2008) argue that fiscal shocks uncovered with annual data are closer to the actual shocks since fiscal policy is not substantially revised within a year. Moreover, the use of annual data eliminates concerns about seasonal patterns in fiscal expenditures.

The annual data utilized include total debt to GDP ratio (d_t), public expenditure (g_t), tax revenue (t_t) and GDP (y_t). The GDP deflator was used to deflate the later three variables. Similar to Blanchard and Perotti (2002) and Burriel et al. (2010) the definition of central government spending is the sum of government consumption and investment, while tax revenue is defined as the government receipts less grants and capital revenue. Variables of interest are expressed all as logs of their real value except total debt ratio which is in logs. We use annual data covering the period 1980-2009. The data was obtained from the Central Bank of Barbados, Central Bank of Jamaica, Central Bank of Trinidad and Tobago, Wold Bank (2009) World Development Indicators and The IMF's (2009) International Financial Statistics.

4.2 Results and Discussion

The starting point is to determine the number of VAR lags for each country's system using the lag selection criteria methods. The VAR for Barbados, Jamaica, Trinidad and Tobago includes one, four and two lags respectively of each endogenous variable. This is according to the results provided by the likelihood ratio (LR) test, the Akaike, Schwatz and Hannan-Quinn information criteria and the final prediction error; see table A1. The next step is to perform unit root tests on all variables in the system. Using Augmented Dickey Fuller and Philips-Perron tests, table A2 report presence of unit roots on all variables though their first differences are stationary. The level-variables are cointegrated hence the structural VEC model is used to identify the structural shocks.

The system is ordered such that fiscal policy variables are first (i.e. public expenditure (g_t) and tax revenue $(t_t))$ since they are exogenous to the economy (see Burriel et al., 2010 and Blanchard and Perotti, 2002). Similar to Burriel et al. (2010), we assume that expenditure decisions are prior to tax ones, which implies a zero value for $\beta_{g,t}$. This allows us to retrieve e_t^g directly from (2a) and to use it in (2b) in order to estimate $\beta_{t,g}$ by ordinary least squares (OLS). Given our objective is to study the effects of fiscal policy shocks, the ordering of the remaining variables total debt to GDP ratio (d_t) and GDP (y_t) is immaterial to the results.

Further assumptions are adopted. Similar to Blachard and Perotti (2002), we rule out any discretionary response of government spending to unexpected contemporaneous movement in economic activity i.e. $\alpha_{g,y} = 0$. Because taxes and government spending are policy variables, there is no contemporaneous effect between them i.e. $\alpha_{t,g} = \alpha_{g,t} = 0$. Combining these assumptions and using the optimal lags on differenced variables, the system is identified and the resulting impulse responses for each country are as shown in Figure A1, A2 and A3. The impulse response function graphs show the response of GDP and debt ratio to government and tax shocks. Due to lack of consistent debt data on Trinidad, a three variable system was estimated such that the impulse response functions reflect the effect of

government spending and tax shocks on GDP only[1]. The results convey important information.

For Barbados, a 1% increase in real government spending has a small negative impact on real GDP growth of 0.02% after a year which gradually dissipates. This implies that injections of government funds are not effective at stimulating economic activity. This result was also found by Ilzetzki et al. (2010) for developing countries. However, it contradicts the findings of Bynoe and Maynard (2008) who found a positive effect; possibly due to their use of Choleski decomposition for restrictions. The Choleski decomposition is not based on economic theory; hence is likely to provide biased results (Enders, 2004). Our estimates also indicate that a 1% positive government spending shock increases the debt ratio by 0.08% a year later. In addition, increased government spending does not significantly affect tax revenues.

A 1% positive tax shock has no immediate effect on real GDP growth. After a year, real GDP growth increases by 0.2% and quickly vanishes. The same tax shock decreases the debt ratio by 0.3% in the following year and gradually declines overtime. This could indicate that the government of Barbados largely increase taxes for fiscal consolidation purposes (e.g. to reduce government debt and fiscal deficits) in order to move the economy from an unsustainable to a sustainable path. Such a tax policy would boosts consumer confidence who respond by increasing real private consumption thereby increasing real GDP growth. In line with this finding, Romer and Romer (2007) also noted that the effect of a U.S. tax shock on output depends on whether it is motivated by the government's desire to stabilize the debt, or unrelated to the stance of fiscal policy. Our results also indicate that positive tax expenditure shocks encourage government spending, which peaks at 0.17% in the second year and quickly dissipates.

In the case of Jamaica, a 1% government spending shock takes 4 years to influence GDP growth by 0.07%. Thereafter the impact quickly disappears and later causes a 0.6% decline in GDP growth. The same shock has no statistically significant effect on tax revenue and debt ratio. A 1% tax shock has no immediate effect on GDP, however, after 4 years it increases GDP growth by 0.14%, rapidly dies down and after 8 years reduces GDP by 0.1%. Additionally, the tax shock has a positive effect of 0.06% on the debt ratio after 4 years and quickly vanishes. The same shock reveals

[1] The absence of debt ratio on Trinidad and Tobago is not expected to affect our results significantly since Trinidad has low debt levels historically.

that increased revenues promote short-lived government spending of 0.3% four years later.

As for Trinidad and Tobago, a 1% shock in government spending increase GDP growth by 0.07% in the second year and with time the effect diminishes in an oscillatory non-negative manner. Further, the spending shock boost tax revenues of 0.34% two years later which slowly vanishes in cyclical way overtime. The effect of tax shocks on GDP exhibit a similar pattern to the effects of government spending shocks. Akin to Barbados and Jamaica (though different lags), positive tax shocks indicate that higher revenues encourage government spending which responds at a maximum of 0.32% in year 2; thereafter it slowly vanishes in an oscillatory manner.

5. Conclusion

This paper builds on previous literature analysing the effects of fiscal policy for economic activity. Using structural vector autoregressive and structural vector error correction models, the study assesses the effects of fiscal policy on economic activity in the Caribbean from 1980-2009. Results indicate that injection of government funds is ineffective in triggering economic activity in the case of Barbados. In both Jamaica and Trinidad and Tobago, government spending has transitory effects on economic activity with a delay of four and two years respectively. Hence, when faced with economic recessions, the neo-Keynesian prescription is more appropriate for Trinidad and Jamaica but is generally a failure for Barbados. However, the slow impact raises questions as to the usefulness of discretionary fiscal policy for short-run stabilization purposes.

Tax shocks are positively related to GDP suggesting that an attempt to stimulate the Caribbean economies with tax cuts may not yield desirable results. However, the results have important implications for the design of fiscal consolidation plans. In particular, our finding suggest that tax reform aimed at curtailing the growth of debt or fiscal deficits may yield desirable results while improving GDP growth in all countries. These findings are very informative to policymakers for containing recessionary effects, stimulating the economy or consolidating the fiscal stance.

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Table A1: **VAR Lag Order Selection Criteria**

	Lag	Log Likelihood	LR	FPE	AIC	HQIC	SBIC
Barbados	0	159.509		2.80E-11	-12.959	-12.907*	-12.7627*
	1	177.698	36.378	2.4e-11*	-13.1415*	-12.881	-12.1598
	2	185.036	14.676	5.50E-11	-12.4197	-11.9508	-10.6526
	3	191.907	13.742	1.70E-10	-11.6589	-10.9817	-9.10645
	4	205.601	27.389*	5.00E-10	-11.4668	-10.5813	-8.12897
Jamaica	0	87.9605		7.30E-11	-11.9944	-12.0113	-11.8118
	1	103.297	30.672	9.10E-11	-11.8995	-11.984	-10.9866
	2	135.018	63.442	2.20E-11	-14.1454	-14.2975	-12.5021
	3	952.957	1635.9	4.7e-59*	-128.708	-128.928	-126.334
	4	1960.07	2014.2*	.	-272.01*	-272.246*	-269.454*
Trinidad & Tobago	0	50.9907		2.10E-07	-6.85582	-6.86849	-6.71888*
	1	54.7399	7.4983	4.70E-07	-6.1057	-6.1564	-5.55793
	2	66.1945	22.909*	4.20E-07	-6.45635*	-6.54509*	-5.49777
	3	71.6562	10.923	1.60E-06	-5.95088	-6.07764	-4.58147
	4	.	.	-7.6e-41*	.	.	.

Notes:

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic

FPE: Final prediction error

AIC: Akaike information criterion

HQIC: Hannan-Quinn information criterion

SBIC: Schwarz's Bayesian information criterion

For Barbados and Jamaica, Δg, Δt, Δd, Δy are the endogenous variables while the constant is exogenous

Δd is excluded from Trinidad and Tobago's endgenous variables.

Δ denotes the first-difference operator.

g represents government spending; t is tax revenue; d denotes debt ratio and y is GDP

Table A2: **Unit Root Tests**

Variable		Augmented Dickey Fuller		Philips Perron	
		Levels	First-difference	Levels	First-difference
Barbados	g	-0.463	-5.656***	-0.433	-5.741***
	t	-1.406	-5.377***	-1.45	-5.386***
	d	-1.168	-4.07***	-1.173	-4.053***
	y	-0.761	-3.702***	-0.873	-3.748***
Jamaica	g	-0.725	-3.761***	-0.682	-3.745***
	t	-1.684	-4.254***	-1.668	-4.293***
	d	-1.183	-2.128*	-1.588	-2.072*
	y	-2.247	-2.764*	-2.14	-2.74*
Trinidad & Tobago	g	-0.719	-7.729***	0.06	-3.854***
	t	-0.135	-3.391**	-0.813	-7.729***
	y	-1.616	-3.759*	0.379	-3.769*

Notes:

*, **,*** are the MacKinnon critical values for the rejection of the null hypothesis of a unit root at the 10%, 5% and 1% significance level respectively.

g represents government spending; t is tax revenue; d denotes debt ratio and y is GDP

Figure A1: **Barbados' impulse response functions**

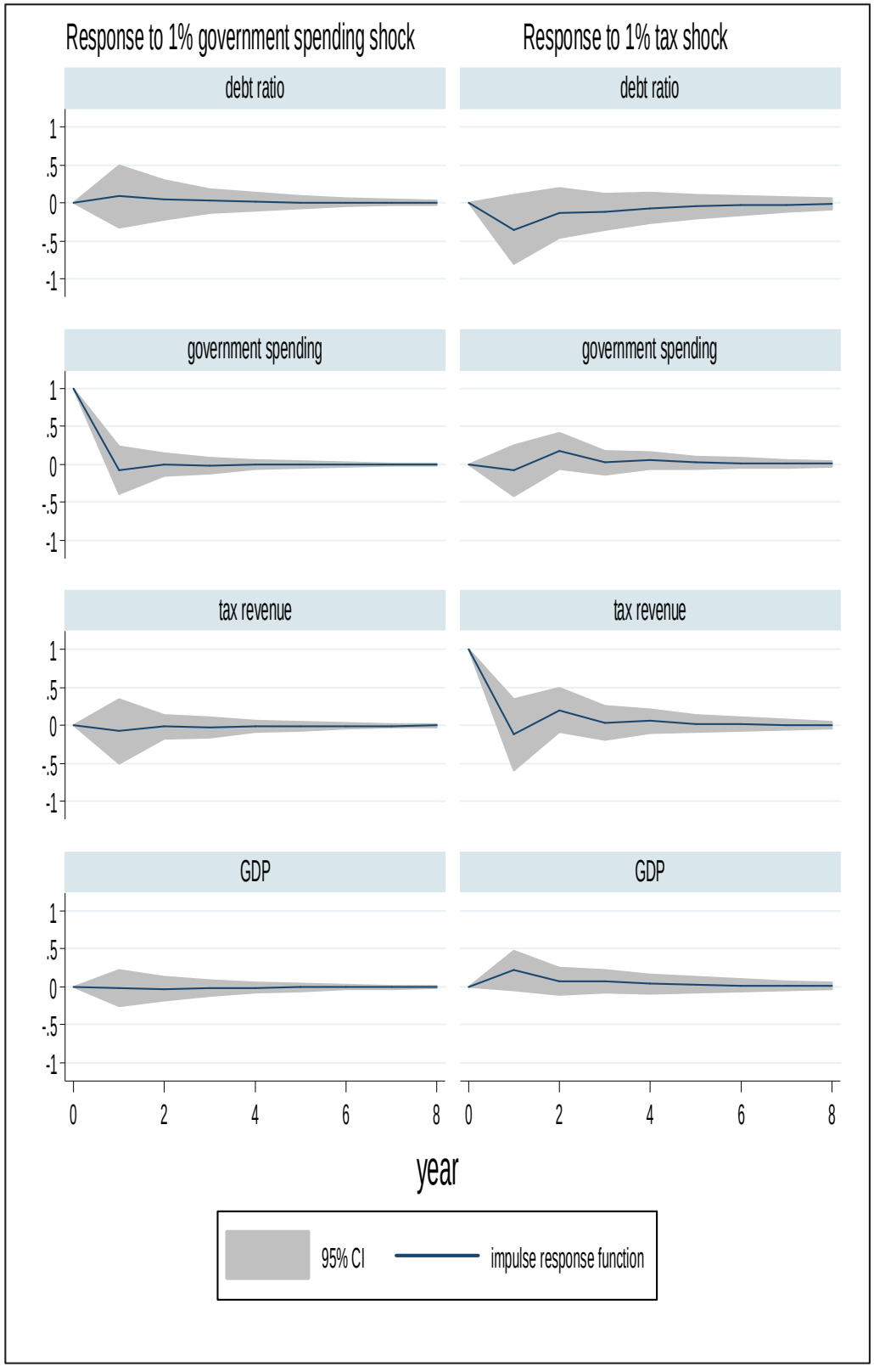

Figure A2: **Jamaica's impulse response functions**

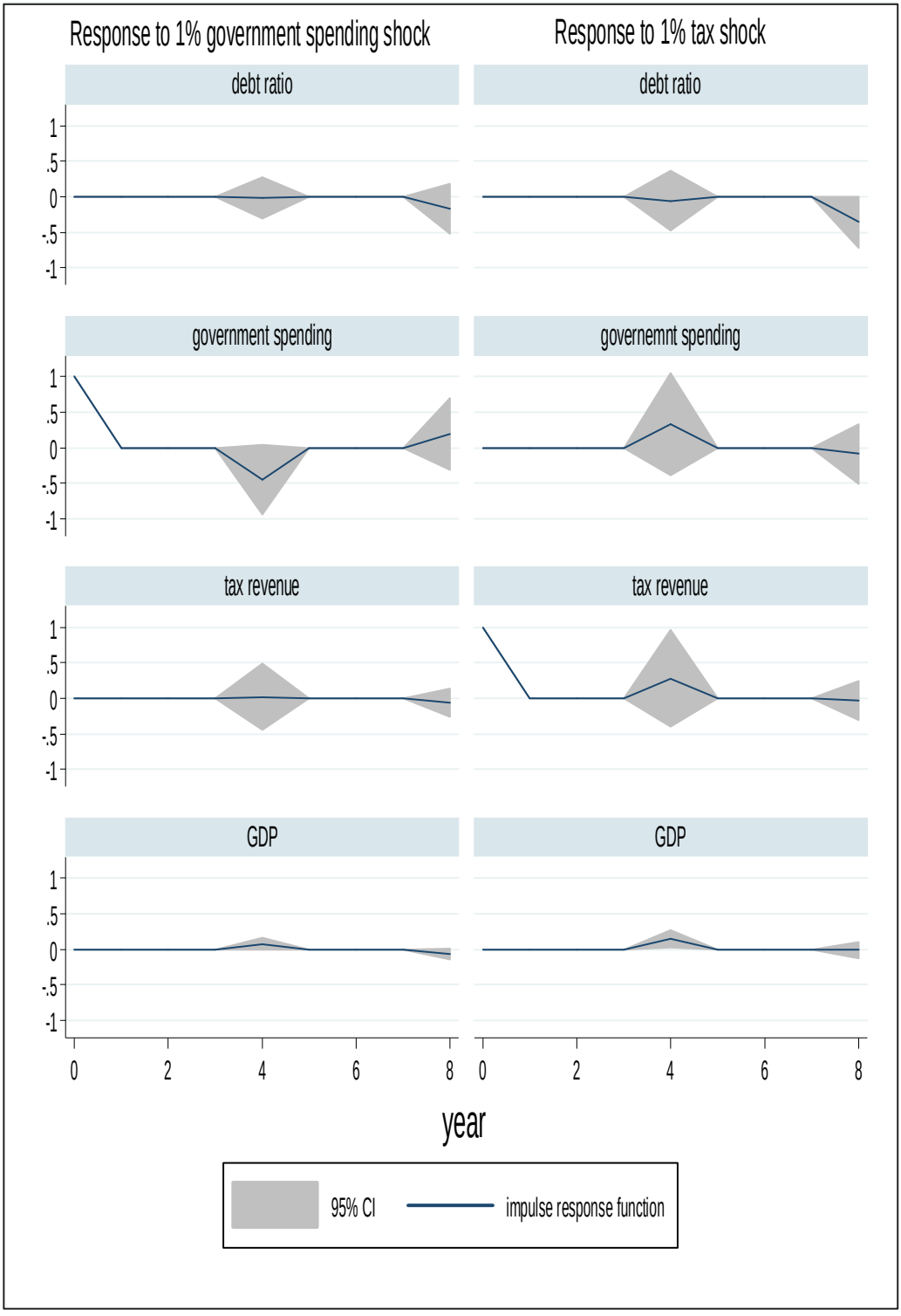

Figure A3: **Trinidad and Tobago's impulse response functions**